11. (New) The Helmholtz resonator of claim 9 wherein said means for changing the frequency response includes at least one restricted connection which is selectively connected between said chamber and said inlet line.

12. (New) The Helmholtz resonator of claim 11 wherein said means for changing the frequency response further includes means for effectively changing the volume of said closed chamber connected to said inlet line via said restricted connections.

REMARKS

Claims 1-8 remain in the application and claims 9-12 have been added. Marked up copies of amended claims 1 and 5 are provided as an attachment.

The present invention is directed to a multiple frequency response Helmholtz resonator for use with a multi-speed engine system to achieve noise attenuation at different engine speeds of operation. In the Background of the Invention the noise problem associated with a plurality of parked refrigeration units is discussed. The use of the term "valve" in the Specification is explained at page 4, lines 16-19 and also notes the absence of fluid flow into or out of the closed chamber. Basically, the present invention changes the frequency response of a Helmholtz resonator responsive to changes in the speed of the engine so as to attenuate engine noise in a plurality of engine operating conditions.

The Bloomer patent disclosed a plurality of embodiments in which a valve moves between two seated positions. The valve is never just open except in the transition between seated positions. In the embodiment of Figures 1-3 you either have two small volume resonators or a single resonator with the combined volumes (see column 1, lines 54-63, particularly lines 62 and 63). In the embodiments of Figures 4-6 the structure

alternates between fluid flow path and resonator. The resonator structure, however, must carry the full flow so it can hardly be considered as having a restriction.

The Takeda patent is primarily concerned with improving engine performance. As stated at column 2, lines 19-36, pipe 5 has a cross sectional area that is at least equal to that of intake pipe 2 and with respect to Figure 3, the only one indicating sound, it is stated at column 3, lines 25-45 that the closing of valve 7 increases noise but increases efficiency (Fig. 2).

The Brackett et al. patent disclosed a Helmholtz resonator having a single neck whose cross sectional area is varied to adjust the response.

The Fuesser et al. patent discloses a segmented main flow duct and a shunt resonator.

The Matsumoto et al. patent is directed to the use of the inertia supercharging effect and the (pulsation) supercharging effect to maintain high volumetric efficiency.

Claims 1-8 stand rejected under 35 U.S.C. § 102(e) as anticipated by Bloomer.

In reading Bloomer against independent claims 1 and 5 the Examiner has read chambers 30 and 31 and restricted connections 28 and 32 as if they define a single Helmholtz resonator but, as is clearly shown in Figure 3, this is not always the case. Claims 1 and 5 have been amended so that they now claim "a closed chamber configured as a single dead end side branch connected to said line and defining a Helmholtz resonator" (emphasis supplied) which is clearly not the case with neck 32 being present in the Bloomer device.

Claims 2 and 6 define over Bloomer for the same reasons as parent claims 1 and 5, respectively.

Claims 3 and 7 require the selective connection of one restricted connection with the chamber but in Bloomer it is the closing/blocking of restriction 32 that produces the volume change that makes the device responsive to other frequencies.

Claims 4 and 8 are dependent from dependent claims 3 and 7, respectively, and define over Bloomer for the same reasons. Further, the claim requires both volume change and connection changes but in Bloomer they are the same in the Examiner's reading of the reference.

Claims 1, 3, 5 and 7 stand further rejected under 35 U.S.C. § 102(b) as anticipated by Takeda.

In reading Takeda against independent claims 1 and 5, the Examiner has read pipe 5 as a "restricted connection" but as stated at column 2, lines 22-25 "(t)he cross-sectional area of the pipe 5 . . . is substantially equal to or larger than that of the intake pipe 2" (emphasis supplied). Accordingly, pipe 5 does not define a restriction relative to intake pipe 2 as is required by the claims. Further, as discussed above, the valve 7 is regulated for engine performance, not noise reduction as required by the claims. As stated at column 3, lines 25-29, "the noise is increased when the valve is closed" so that valve 7 increases noise to increase engine performance but does not reduce noise as required by the claims.

As to dependent claims 3 and 7, pipe 5 of Takeda is not a restricted connection, as discussed above, and required by the claims.

Newly added claims 9-12 correspond to amended claims 5 to 8 with additional limitations.

For the reasons set forth above, it is believed that claims 1-12 define over the references of record and are now in condition for allowance.

Reconsideration of the rejection of claims 1-8 is hereby requested.

Respectfully submitted,
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DJZ/jn

Attachment

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope address to: Assistant Commissioner of Patent and Trademarks, Washington, D.C. 20231,

September 12, 2002
Date of Deposit

BARBARA Z. MELVIN
Name of Applicant, Assignee, or Registered Representative

Barbara E. Melvin
Signature

9/12/02
Date of Signature

CLAIMS

What is Claimed is:

(AMENDED)

1. In a system having a multi-speed engine with an air inlet line connected to said engine, a Helmholtz resonator structure comprising:
CONFIGURED AS A SINGLE DEAD END SIDE BRANCH CONNECTED TO SAID LINE AND
a closed chamber defining a Helmholtz resonator continuously operatively connected to said inlet line via a restricted connection; and
ATTENUATING NOISE IN A PLURALITY OF FREQUENCIES BY
means for changing the frequency response of said Helmholtz resonator responsive to changes in speed of said engine.

2. The Helmholtz resonator of claim 1 wherein said means for changing the frequency response includes means for effectively changing the volume of said closed chamber connected to said inlet line.

3. The Helmholtz resonator of claim 1 wherein said means for changing the frequency response includes at least one restricted connection which is selectively connected between said chamber and said inlet line.

4. The Helmholtz resonator of claim 3 wherein said means for changing the frequency response further includes means for effectively changing the volume of said closed chamber connected to said inlet line via said restricted connections.

(AMENDED)

5. A refrigeration system having a multi-speed engine with an inlet line connected to said engine, microprocessor means for controlling the speed of said engine, the improvement comprising:

CONFIGURED AS A SINGLE DEAD END SIDE BRANCH CONNECTED TO SAID LINE AND a closed chamber defining a Helmholtz resonator continuously operatively connected to said inlet line via a restricted connection; and

ATTENUATING NOISE IN A PLURALITY OF FREQUENCIES BY means for changing the frequency response of said Helmholtz resonator responsive to changes in speed of said engine.

6. The Helmholtz resonator of claim 5 wherein said means for changing the frequency response includes means for effectively changing the volume of said closed chamber connected to said inlet line.

7. The Helmholtz resonator of claim 5 wherein said means for changing the frequency response includes at least one restricted connection which is selectively connected between said chamber and said inlet line.

8. The Helmholtz resonator of claim 7 wherein said means for changing the frequency response further includes means for effectively changing the volume of said closed chamber connected to said inlet line via said restricted connections.